

Wall Street, Linn Co., Kans.: snow began falling at 2 p. m. on the 19th, and at 7.30 p. m. the storm became very severe, the wind blowing in short puffs of unusual violence, while at intervals there were perfect calms. The storm continued during the night, and at 6.15 a. m. on the 20th, with a temperature of 2° below zero, it raged with great violence; the snow drifted so that roads were impassable. The storm suddenly subsided at 6 p. m.

Los Angeles, Cal.: during the evening of the 21st a brisk northeast wind prevailed; maximum velocity twenty-four miles per hour. Reports state that in the surrounding country considerable damage was done by the wind; a number of houses were demolished in the Santa Anna Valley, and in the San Bernardino district.

Northfield, Vt.: high northeast to northwest winds prevailed during the 16th; a maximum velocity of forty miles per hour from northwest was recorded at 10.55 a. m.

Hatteras, N. C.: a gale began at 11 a. m. of the 17th, and continued during the remainder of the day; maximum velocity, forty-eight miles per hour from the west, at 8.05 p. m.

Boston, Mass.: high easterly winds prevailed from midnight of the 18th until 3.43 a. m., when a maximum velocity of fifty-six miles was recorded, after which time the wind abated.

Several newspapers published accounts of a storm which occurred during the early morning of the 17th at Armstrong Academy and Fort Washita, in the Indian Territory, near the Texas border. The following extract from the "New York Herald" of the 19th relates to this storm, which appears to have been a well-defined tornado:

LITTLE ROCK, ARK., December 18, 1887.—A special from Cove, Polk Co., reports that a destructive cyclone visited Armstrong Academy, Ind. T., Fort Washita, and Green, at an early hour on Saturday (17th) morning, causing great destruction of property and loss of life. A terrible rumbling sound was heard about five o'clock. A heavy black cloud, funnel-shaped, was seen in the distance and rapidly approaching. When about a mile north of Fort Washita it struck the ground, and from that point south for miles the work of ruin was continued. The cyclone traveled at the rate of about a mile a minute. In an

instant from the time it struck the earth half the houses in Fort Washita were in ruins. Armstrong Academy was not greatly injured, but ranches in the immediate neighborhood suffered greatly. At Green, a little hamlet six miles south of Armstrong, the damage was very heavy and many persons were injured. Seventeen houses and a general store were carried away bodily, while horses and cattle within the territory covered by the storm were killed or maimed. Two children killed at Green were carried about sixty yards by the wind and dashed to the ground, mangled so as to be almost unrecognizable. Many cattle and other stock were also killed by lightning. The storm only lasted about six minutes at any one point.

Omaha, Nebr.: northwesterly winds prevailed from 9.15 p. m. on the 19th to 11.05 p. m. on the 20th; maximum velocity, forty-two miles per hour.

Cairo, Ill.: a strong gale, accompanied by severe cold, prevailed from noon until 2 p. m. of the 20th; maximum velocity, forty-eight miles per hour.

Wood's Holl, Mass.: a maximum wind-velocity of fifty-eight miles per hour was recorded at 4.30 p. m. on the 22d. The storm began during the forenoon and ended at 9 p. m.

New London, Conn.: during the 28th the wind increased in force until it attained a maximum velocity of sixty miles per hour, and from 12.30 to 4.30 p. m. it blew steadily at the rate of forty miles per hour; after 4.38 p. m. the wind rapidly diminished. This storm is rated as among the most severe for many years; little damage, however, was done in this city.

Portland, Me.: high winds, reaching a maximum velocity of fifty-one miles per hour and accompanied by rain and snow, prevailed during the 28th. The storm was of unusual severity, causing much damage on both land and water in this vicinity.

Keeler, Cal.: a storm, during which a maximum velocity of forty miles per hour from the south was recorded, occurred on the 29th. The heavy snowfall north of this city interrupted telegraphic communication and caused the delay of trains.

Frisco, Utah: on the 29th a maximum wind-velocity of sixty-five miles per hour was recorded, and during the greater part of the day a southwesterly wind blew at the rate of from forty to fifty-eight miles per hour.

## INLAND NAVIGATION.

### ICE IN RIVERS AND HARBORS.

Hudson River.—Albany, N. Y.: floating ice on 1st, 2d, and from 17th to 22d; the river froze over on 23d, closing navigation.

The following table, showing dates of closing of navigation at this point for each season since 1867, is from the "Albany Evening Journal" of the 21st:

Year.	Navigation closed.	Year.	Navigation closed.
1867	December 8	1877	December 31
1868	December 5	1878	December 30
1869	December 9	1879	December 30
1870	November 17	1880	November 25
1871	November 29	1881	•
1872	December 9	1882	December 4
1873	November 22	1883	December 15
1874	December 12	1884	December 19
1875	December 29	1885	December 13
1876	December 2	1886	December 3

• Boats ran this winter until January 2.

The Albany "Evening Post" of the 20th states:

Only four times during the past fifty years has the Hudson River been open for uninterrupted navigation at this date. The Troy boats are still running, making regular trips to Albany and Troy. The Albany boats have stopped.

Delaware, Lehigh, and Schuylkill rivers.—Philadelphia, Pa.: navigation on the Lehigh and Schuylkill was closed on the 28th; floating ice in the Delaware on the 29th and 30th.

Lake Ontario.—Oswego, N. Y.: the steam barges "Resolute" and "Reliance" left port on the morning of the 16th, the last departures of the season.

Niagara River.—Buffalo, N. Y.: navigation closed on the 14th; the river froze on the 29th.

Presque Isle Bay.—Erie, Pa.: the bay froze over for the first time this season on the 23d.

Lake Erie.—Cleveland, Ohio: navigation closed on 15th.

Sandusky River.—Sandusky, Ohio: navigation closed on the 20th; the river froze over on the 22d.

Maumee River.—Toledo, Ohio: the last boat of the season left port on the 11th; the river froze over on the 22d.

Grand River.—Grand Haven, Mich.: the river opened on the 1st, and partially froze over again on the 29th.

Saint Clair River.—Port Huron, Mich.: navigation closed on the 10th; the river froze over on the 24th.

Thunder Bay River.—Alpena, Mich.: the river froze over and navigation closed on the 23d.

Mackinaw Strait.—Mackinaw City, Mich.: the ice broke up in the strait and moved into Lake Michigan on the 23d.

Lake Michigan.—Chicago, Ill.: navigation closed on 13th.

Little Bay de Noquet.—Escanaba, Mich.: navigation closed on the 15th; the bay froze over on the 30th.

Missouri River.—Omaha, Nebr.: the river froze on the 5th, 11th, 21st, and 28th, and opened 6th, 12th, and 23d.

Leavenworth, Kans.: the river froze on the 21st, and on the 27th loaded wagons, etc., crossed on the ice.

Mississippi River.—La Crosse, Wis.: the river was frozen throughout the month.

Dubuque, Iowa: the river froze over on the 10th.

Keokuk, Iowa: floating ice on 5th; river froze over on 22d.

Cairo, Ill.: steamers arriving on the 21st from the south bound for Saint Louis were compelled to tie up in this harbor, owing to running ice and the low stage of water in the river;

navigation between this point and Saint Louis was practically suspended after this date. There was floating ice in the river on the 27th, 28th, and 30th.

**Ohio River.**—Cairo, Ill.: reports from Metropolis, Ill., state that the heavy floating ice interrupted navigation on the 29th; on this date the packet running between Cairo and Paducah, Ky., was compelled to discontinue trips.

Louisville, Ky.: the river was covered with thin ice on the morning of the 29th, on which date navigation was suspended for all boats except the larger steamers.

Laconia, Harrison Co., Ind.: navigation was suspended on the 30th on account of low water and floating ice in the river.

**Allegheny and Monongahela rivers.**—Pittsburg, Pa.: floating ice in both rivers from the 23d to the 26th and 28th, and in the Monongahela on the 30th and 31st; the Allegheny froze over on the 31st.

#### HIGH TIDES.

Coney Island, N. Y.: this island was swept by a northeast gale on the 28th, and the hotels and other property near the beach were badly damaged by the high tide. The beach was strewn with large quantities of timber and debris.

Long Beach, N. J.: the strong southeasterly gale on the 28th caused a very high tide which damaged property to a great extent.

High tides also occurred as follows:

Duke, Fla., 1st.; Chicamcomico, N. C., 1st to 3d; Eastport, Me., 16th; Wilmington, N. C., 17th; Atlantic City, N. J., 18th.

#### LOW TIDE.

Staten Island, N. Y.: an unusually low tide occurred on the 29th. "Split Rock," in the bay of Tompkinsville, L. I., which had not been seen for several years, was exposed to view.

#### STAGE OF WATER IN RIVERS AND HARBORS.

In the following table are shown the danger-points at the various stations and the highest and lowest depths for December, with the dates of occurrence, and the monthly ranges:

Heights of rivers above low-water mark, December, 1887 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River:						
Shreveport, La.....	29.9	24, 25	21.6	1	8.0	13.6
Arkansas River:						
Fort Smith, Ark....	22.0	4	8.8	30	1.1	7.7
Little Rock, Ark....	23.0	7	10.1	1	1.4	8.7
Missouri River:						
Omaha, Nebr.....	18.0	24, 25, 26	6.1	12, 13	2.1	4.0
Leavenworth, Kans.	20.0	5	4.1	15, 16	3.2	0.9
Mississippi River:						
Saint Paul, Minn....	14.5					
La Crosse, Wis.....	24.0					
Dubuque, Iowa.....	16.0	5, 6, 7	3.2	2	1.8	1.4
Keokuk, Iowa.....	14.0	21	1.7	3, 6	0.0	1.7
Saint Louis, Mo....	32.0	9	7.5	26, 27	0.8	6.7
Cairo, Ill.....	40.0	12, 13	8.0	31	2.0	6.0
Memphis, Tenn.....	34.0	14, 15, 16	6.0	1, 2, 31	2.6	3.4
Vicksburg, Miss....	41.0	20	5.0	2, 3	3.5	8.5
New Orleans, La....	13.0	23	2.8	1, 30	1.6	1.2
Ohio River:						
Pittsburg, Pa.....	22.0	7	6.9	30	3.8	3.1
Cincinnati, Ohio....	50.0	17	7.5	2, 3	4.3	3.2
Louisville, Ky.....	25.0	20	4.4	2, 3	3.2	1.2
Cumberland River:						
Nashville, Tenn....	40.0	27, 28	3.6	1, 2, 3	0.8	2.8
Tennessee River:						
Knoxville, Tenn....	.....	29	4.5	4	1.8	2.7
Chattanooga, Tenn.	33.0	30	5.5	2-6	1.6	3.9
Monongahela River:						
Pittsburg, Pa.....	29.0	7	6.9	30	3.8	3.1
Savannah River:						
Augusta, Ga.....	32.0	25	15.1	2-5	6.0	9.1
Sacramento River:						
Red Bluff, Cal.....	.....	29, 30	1.9	21-27	0.6	1.3
Sacramento, Cal....	.....	30	10.8	24-28	7.5	3.3
Willamette River:						
Portland, Oregon....	.....	9	10.6	24	1.6	9.0

\* Frozen after 20th.

† River frozen entire month.

‡ Below bench-mark.

Nashville, Tenn.: the first steamer since the suspension of navigation on account of low water, came up the Cumberland River from the Ohio on the 10th, the depth of water shown by the Nashville gauge being two and eight-tenths feet on that date. Navigation on the lower Cumberland was resumed on the 26th, and on the upper Cumberland on the 29th.

## ATMOSPHERIC ELECTRICITY.

### AUORAS.

Auroras were observed during the month as follows: 6th, Cornish and Kent's Hill, Me.; North Truro, Mass.; Manitowoc, Wis. 7th and 8th, Manitowoc, Wis. 12th, Fort Totten, Fort Buford, and Webster, Dak.; Cornish, Me.; Cambridge, Mass.; Moorhead and Saint Vincent, Minn.; Poplar River, Mont. 13th, Webster, Dak.; Cornish, Eastport, and Kent's Hill, Me.; Poplar River, Mont.; Nashua, N. H.; Block Island, R. I. 14th, Egg Harbor City, N. J.; Manitowoc, Wis. 15th, Fort Buford, Dak. 16th, Bismarck, Dak.; Cornish and Kent's Hill, Me.; Moorhead and Saint Vincent, Minn.; Fort Custer and Poplar River, Mont.; Northfield, Vt. 17th, Fort Buford, Dak.; Cresco, Iowa; Duluth, Minn.; Poplar River, Mont.; Nashua, N. H. 18th, Saint Vincent, Minn. 20th, Wakefield, Kans. 21st, Webster, Dak.; Cornish, Eastport, and Kent's Hill, Me.; Blue Hill Observatory, Cambridge, and Fall River, Mass.; Moorhead and Saint Vincent, Minn.; Nashua, N. H.; Block Island, R. I.; Northfield, Vt. 22d, Blue Hill Observatory, Mass. 29th, Des Moines, Iowa.

### THUNDER-STORMS.

Thunder-storms occurred as follows: Dodge City, Kans., 1st; Palestine, Tex., 3d; and Salt Lake City, Utah, 30th.

### ELECTRICAL PHENOMENA.

Keeler, Cal.: on the evening of the 1st, during a light rain storm, and after the rain had ceased, the atmosphere was charged with electricity to an unusual degree, as was shown by the working of telegraph instruments. The office stove emitted electric sparks one-eighth of an inch in length.

Fort Sully, Dak.: on the 3d the telegraph wires were highly charged with atmospheric electricity; electric sparks one inch long were observed about the "cut-out" at 10 p. m.

Cheyenne, Wyo.: the presence of atmospheric electricity was very marked on the 12th; sparks one-eighth of an inch in length were produced by touching the steam heater, and all metallic surfaces or points when touched gave shocks which were quite perceptible.

## MISCELLANEOUS PHENOMENA.

### METEORS.

Dale Enterprise, Rockingham Co., Va.: a brilliant meteor was observed on the 11th, moving west; this vicinity was lighted up for several seconds as if by a prolonged flash of lightning.

Meteors were also observed as follows:

3d, Cleburne, Tex. 4th, Clayton, N. J. 5th, Little Rock,

Ark.; Biloxi, Miss.; Fort Stanton, N. Mex. 6th, Clayton and Egg Harbor City, N. J. 7th, Wilson, Kans.; Woodstock, Md.; Kalamazoo, Mich. 8th, Fort Buford, Dak. 9th, Savannah, Ga. 10th, Stateburg, S. C. 11th, Wilson and Yates Center, Kans.; East Portland, Oregon; Quakertown, Pa.; Stateburg, S. C.; University of Virginia, Va. 12th, Archer and Cedar Keys, Fla.; Lebo and Wilson, Kans.; Beverly, N. J.; Charlotte,